Contents

PART 1

i Editorial
1 Book Reviews
5 Carbon and nitrogen nutrition of nodulated roots of grain legumes: a review
F. R. Minchin, R. J. Summerfield, P. Hadley, E. H. Roberts & S. Rawsthorne
27 Sites of acid phosphatase in the differentiating root protophloem of *Nymphoides peltata* (S. G. Gmel.) O. Kuntze.: support for the role of stacked ER in sieve-element autolysis
K. J. Oparka, R. P. C. Johnson & I. D. Bowen
37 Compartmental modelling of photorespiration and carbon metabolism of water stressed leaves
D. W. Lawlor & J. G. Pearlman
53 Temporal separation of two components of phytochrome action
G. C. Whitelam & C. B. Johnson
59 Photosynthetic induction in wheat protoplasts and chloroplasts. Autocatalysis and light activation of enzymes
R. C. Leegood & D. A. Walker
67 The use of immunological methods to study the activity of cellulase isozymes (B 1 : 4 glucan 4-glucan hydrolase) in bean leaf abscission
M. L. Durbin, R. Sexton & L. N. Lewis
75 Ontogenetic variation in response to temperature change in the control of seed dormancy of *Rumex obtusifolius* L. and *Rumex crispus* L.
S. Totterdell & E. H. Roberts
81 Yield components in *Hevea brasiliensis*—theoretical considerations
M. R. Sethuraj

PART 2

85 Book Reviews
89 Light measurement and the terminology of flow: opinion
C. J. Bell & D. A. Rose
97 Seed dormancy in *Rumex* species in response to environmental factors: review article
E. H. Roberts & Susan Totterdell
107 Root geotropism and the role of growth regulators from the cap: a re-examination: review article
M. B. Jackson & P. W. Barlow
125 The role of the shoot apex in geotropism: short communication
R. D. Firn, J. Digby & A. Hall
131 The geotropic reaction and statolith movements following geostimulation of mung bean hypocotyls
D. G. Heathcote
141 The dependence of auxin transport on cell length: short communication
E. Wangermann & G. J. Mitchison
145 Relationship of the cell cycle to xylem cell differentiation; A new model: brief review
J. H. Dodds
147 Genetic variability and heritability of drought-induced abscisic acid accumulation in spring wheat
S. A. Quarrie
153 Respiration rates of apple trees, estimated by CO_2-efflux measurements
D. R. Butler & J. J. Landsberg
161 C_4 photosynthesis in *Cyperus longus* L., a species occurring in temperate climates
M. B. Jones, G. E. Hannon & M. D. Coffey
169 Plasmalemmasomes in cotyledon leaves of germinating *Vigna radiata* L. (mung beans)
N. Harris
177 The effect of salinity on the yield and composition of *Diplachne fusca* (Kaller grass)
G. R. Sandhu, Z. Aslam, M. Salim, A. Sattar, R. H. Qureshi, N. Ahmad & R. G. Wyn Jones

PART 3

183 Book Reviews
189 Invalidity of the multiphasic concept of ion absorption in plants
A. C. Borstlap
197 Phototropism and geotropism in hypocotyls of cress (*Lepidium sativum*. L.)
J. W. Hart & I. R. MacDonald
203 How do plant growth substances work? Opinion section
A. Trewavas
229 Changes in sensitivity of *Amaranthus retroflexus* L. seeds to ethylene during preincubation. I. Constant temperatures
M. W. Schonbeck & G. H. Egley
237 Changes in sensitivity of *Amaranthus retroflexus* L. seeds to ethylene during preincubation. II. Effects of alternating temperature and burial in soil
M. W. Schonbeck & G. H. Egley
243 Ecophysiological studies on Sonoran desert plants. VI. Seasonal photosynthesis and production of *Machaeranthera gracilis*, a winter ephemeral
D. A. Anderson & S. R. Szarek
251 Diurnal changes in the regulatory properties of PEP-carboxylase in Crassulacean Acid Metabolism (CAM)
M. Kluge, J. Brulfert & O. Queiroz

257 Membrane potential measurements of marine macroalgae; *Porphyra purpura* and *Ulva lactuca*: short communication
R. H. Reed & J. C. Collins
261 Ultrastructural features of chilling-injury in *Episcia reptans*: short communication
Colette Murphy & J. M. Wilson

PART 4

267 Book Reviews
271 Methods for quantitative determination of ethylene in aqueous solutions for biological studies
P. K. Bassi, K. C. Eastwell, T. Akalehiywot & M. S. Spencer
275 A systematic approach to the simulation of short-term processes in the plant-environment complex
K. R. Christian & F. L. Milthorpe
285 Photosynthetic carbon assimilation in the blue-green alga *Coccochloris peniocystis*
J. R. Coleman & B. Colman
291 Biosynthesis of ethylene in higher plants: the metabolic site of inhibition by phosphate
Y. Fuchs, A. K. Mattoo, E. Chalutz & I. Rot
297 Nutrient inflows into apple roots. I. ^{32}P-orthophosphate uptake from solution by M.9 rootstocks and Worcester Pearmain seedlings.
K. K. S. Bhat
303 A compartmental model of carbon allocation in the vegetative barley plant
J. Prosser & J. F. Farrar
309 The kinetics of rehydration of detached sunflower leaves from different initial water deficits
M. T. Tyree, P. Cruiziat, M. Benis, M. A. LoGullo & S. Salleo
319 Cell wall architecture: normal development and environmental modification of guard cells of the Cyperaceae and related species
M. Mishkind, B. A. Palevitz & N. V. Raikhel
329 Relationships between sap flow and water potential in woody or perennial plants on islands of the Great Barrier Reef
W. G. Allaway, M. G. Pitman, R. Storey & S. Tyerman
339 Nutation of growing and georeacting roots: short communication
D. Ney & P.-E. Pilet

PART 5

345 Book Reviews
349 Water permeability of plant cuticular membranes: the effects of humidity and temperature on the permeability of non-isolated cuticles of onion bulb scales
J. Schönherr & T. Mérida
355 Regularly aligned mitochondria in aleurone and sub-aleurone layers of developing rice caryopses
K. J. Oparka, P. J. Gates & D. Boulter
359 Charge balance and acidity regulation during growth of sugar-cane cell suspensions
E. Komor, M. Thom & A. Maretzki
367 Salinity-dependent regulation of starch and glycerol metabolism in *Dunaliella parva*
H. Gimmler & E.-M. Moller
377 Changes in phenylalanine ammonia-lyase levels in excised potato tuber tissue: effects of the gaseous environment and desensitization to cinnamate repression by *in situ* pre-incubation
B. G. Smith & P. H. Rubery
383 Uptake of triphenyltin chloride by *Enteromorpha intestinalis* and *Ulothrix pseudoflacca*
P. A. Millner & L. V. Evans
391 Improvement of the heat pulse method for determining sap flow in trees
Y. Cohen, M. Fuchs & G. C. Green
399 Leaf expansion of four sunflower (*Helianthus annuus* L.) cultivars in relation to water deficits. I. Patterns during plant development
S. Takami, N. C. Turner & H. M. Rawson

PART 6

409 Book Reviews
417 The evolutionary relationship between stomatal mechanism, crassulacean acid metabolism and C_4 photosynthesis: opinion
W. Cockburn
419 Phosphorylation of histone H1 during the cell cycle of artichoke
B. R. Stratton & A. J. Trewavas
427 Chloroplast ultrastructure in two Crassulacean species and an F_1 hybrid with differing biomass $\delta^{13}C$ values
J. A. Teeri & J. Overton
433 Time-dependent changes in the responsiveness to light of phytochrome-mediated anthocyanin synthesis
R. Schmidt & H. Mohr
439 Phytochrome-mediated responses in light-grown corn showing rapid, reverse reciprocity failure
H. L. Gorton & W. R. Briggs
449 Rapid, reverse reciprocity failure for phytochrome control of its own accumulation
H. L. Gorton & W. R. Briggs
455 Cytological evidence for cytoplasmic volume control in *Platymonas subcordiformis* after osmotic stress
G. O. Kirst & D. Kramer
463 A new method of measuring water potential in tree stems by water injection: technical note
W. R. N. Edwards & P. G. Jarvis
467 Instructions to contributors